

WHAT IS CLAIMED IS:

1. A deformable bone implant, comprising:
a interface portion for interfacing with a bone;
and
a support structure for supporting the interface portion.
2. A deformable bone implant according to claim 1, wherein the support structure is comprised of a central core.
3. A deformable bone implant according to claim 1, wherein the support structure is comprised of a truss-like structure of rods.
4. A deformable bone implant according to claim 1, wherein the support structure is comprised of a mesh of fibers or wires arranged to have opens areas within the mesh.
5. A deformable bone implant according to claim 1, wherein the support structure is comprised of at least one helical spring element.

6. A deformable bone implant according to claim 1, wherein the support structure is formed of at least two types of materials each having a different Young's modulus, and the at least two types of materials are arranged to provide a varying Young's modulus along a longitudinal axis of the support structure.

7. A deformable bone implant according to claim 1, wherein the support structure comprises an inflatable portion.

8. A deformable bone implant according to claim 1, wherein the interface portion comprises a plurality of support elements protruding therefrom.

9. A deformable bone implant according to claim 8, wherein at least a portion of each of the plurality of support elements is resiliently deformable.

10. A deformable bone implant according to claim 8, wherein at least one of the plurality of support elements is adapted to fit snugly within a bone canal.

11. A deformable bone implant according to claim 8, wherein the plurality of support elements comprises

protrusions that resiliently deform and deflect during insertion of the bone implant into a bone canal such that the plurality of support elements exerts a force against a wall of the bone canal and the implant fits snugly within the bone canal.

12. A deformable bone implant according to claim 1, further comprising an adjustable cable for adjusting a tension in the support structure to thereby adjust stiffness and/or curvature of the implant.

13. A deformable bone implant according to claim 12, wherein the adjustable cable is supported by at least one bridge element.

14. A deformable bone implant according to claim 1, further comprising a plurality of adjustable cables for adjusting a tension in the support structure to thereby adjust stiffness and/or curvature of the implant.

15. A deformable bone implant according to claim 14, wherein the adjustable cables are adjusted to provide an asymmetric or non-uniform level of tension to the plurality of adjustable cables.

16. A deformable bone implant according to claim 14, wherein the adjustable cables are adjusted before, during, and/or after implantation of the bone implant.

17. A deformable bone implant according to claim 14, wherein the adjustable cables are adjusted to provide a variable rigidity to the bone implant.

18. A deformable bone implant according to claim 1, wherein the interface portion contains at least one type of prescribed medication that is administered into a bone canal of the bone.

19. A deformable bone implant according to claim 18, wherein the interface portion is coated with a material selected from the group consisting essentially of a hydroxyapatite-based substance, a porous bone substance, an inorganic bovine bone substance, an osteoconductive bone graft substitute, and a synthetic bone graft substitute.

20. A deformable bone implant according to claim 19, wherein the material contains a bone morphogenic protein and/or medication for preventing bone diseases.

21. A bone brace, comprising:

a longitudinal sleeve element for encircling at least a portion of an outer circumference of a bone; and

a trough portion attached to the longitudinal sleeve element and facing the bone.

22. A bone brace according to claim 21, wherein the trough portion is comprised of a corrugated portion.

23. A bone brace according to claim 21, further comprising an adjustable cable for adjusting a tension in the longitudinal sleeve element to thereby adjust stiffness and/or curvature of the bone brace.

24. A bone brace according to claim 23, wherein the cable is supported by at least one bridge element.

25. A bone brace according to claim 21, further comprising a plurality of adjustable cables for adjusting a tension in the longitudinal sleeve element to thereby adjust stiffness and/or curvature of the bone brace.

26. A bone brace according to claim 25, wherein the adjustable cables are adjusted to provide an asymmetric or non-uniform level of tension to the plurality of adjustable cables.

27. A bone brace according to claim 25, wherein the adjustable cables are adjusted before, during, and/or after installation of the bone brace.

28. A bone brace according to claim 25, wherein the adjustable cables are adjusted to provide a variable rigidity to the bone brace.

29. A bone brace according to claim 21, wherein the trough portion is coated with a material selected from the group consisting essentially of a hydroxyapatite-based substance, a porous bone substance, an inorganic bovine bone substance, an osteoconductive bone graft substitute, and a synthetic bone graft substitute.

30. A bone brace according to claim 29, wherein the material contains a bone morphogenic protein and/or medication for preventing bone diseases.

31. A bone brace according to claim 21, further comprising a woven reinforcement bandage positioned between the brace and the bone, wherein at least a portion of the bandage is molded with the longitudinal sleeve element and/or the trough portion.

32. A bone brace according to claim 21, further comprising a liner positioned between the trough portion and the bone.

33. A bone brace according to claim 32, wherein the liner is molded with the longitudinal sleeve element and/or the trough element.

34. A bone implant, comprising:
a longitudinal sleeve element for at least partially encircling an outer circumference of a bone; and
a plurality of support elements attached to the sleeve element and contacting the bone, wherein
the sleeve element including the plurality of support elements becomes embedded in newly-generated bone tissue to form a composite bone structure.

35. A bone implant, comprising:
an interface portion supported by a support structure; and
a plurality of resiliently deformable support elements protruding from the interface portion, wherein
the plurality of support elements contact a wall of a bone canal such that the implant conforms to and fits snugly within the bone canal, and

the plurality of support elements comprising protrusions that resiliently deform and deflect during insertion of the implant into the bone canal such that the plurality of support elements exert a force against the wall of the bone canal.

36. A bone implant according to claim 35, wherein the plurality of support elements comprises longitudinal support members contacting the wall of the bone canal over substantially continuous portions of the support members.

37. A bone implant according to claim 35, wherein the plurality of support elements comprises a group of adjacent elements positioned in a substantially longitudinal manner with respect to the bone canal, the group of adjacent elements contacting the wall of the bone canal over a substantially continuous portion thereof.

38. A bone implant according to claim 35, further comprising at least one elongated tension member attached to the interface portion, wherein the at least one tension member becomes embedded in newly generated bone tissue and/or bonded to the wall of the bone canal to form a composite bone structure.

39. A bone implant according to claim 35, wherein each support element comprises a trough-like element which contacts the wall of the bone canal to serve as a catalyst for bone tissue growth.

40. A bone implant according to claim 39, wherein the trough-like element comprises a plurality of fingers for engaging the wall of the bone canal.

41. A bone implant according to claim 38, wherein at least a portion of the elongated tension member is surrounded with a loosely woven mesh of fibers and/or whisker reinforcement elements.

42. A bone implant according to claim 41, wherein the elongated tension member, the woven mesh, and/or the whisker reinforcement elements are coated with at least one material selected from the group consisting essentially of a hydroxyapatite-based substance, a porous bone substance, an inorganic bovine bone substance, an osteoconductive bone graft substitute, a synthetic bone graft substitute, bone morphogenic protein, and medication for preventing bone diseases.

43. A bone implant according to claim 38, wherein

the elongated tension member is supported by at least one bridge element attached to the interface portion.

44. A bone implant according to claim 38, wherein the elongated tension member is attached to the interface portion with an adhesive.

45. A bone implant according to claim 35, further comprising a woven sleeve element surrounding the plurality of support elements.

46. A bone implant according to claim 45, wherein the woven sleeve element comprises an elongated tension member.

47. A bone implant according to claim 45, further comprising a lining interposed between the woven sleeve element and the support elements for flexibly pressing the woven sleeve element against the wall of the bone canal.

48. A bone implant according to claim 47, wherein the woven sleeve element and/or the lining extends beyond an end of the support structure to interface the wall of the bone canal.

49. A bone implant according to claim 35, wherein the support structure is comprised of a truss-like structure of rods.

50. A bone implant according to claim 35, wherein the support structure is comprised of a mesh of fibers or wires arranged to have open areas within the mesh.

51. A bone implant according to claim 35, wherein the support structure is comprised of at least one helical spring element.

52. A bone implant according to claim 35, wherein the support structure is formed of at least two types of materials each having a different Young's modulus, and the at least two types of materials are arranged to provide a varying Young's modulus along a longitudinal axis of the support structure.

53. A bone cement for a bone implant, the bone cement comprising:

a cement material; and

whisker reinforcement elements mixed with the cement material, wherein

the whisker reinforcement elements are comprised

of metal or non-metal fibers.

54. An intramedullary implant, comprising a nail formed of a drillable material.

55. An intramedullary implant according to claim 54, wherein the nail has pre-drilled holes and further comprising plastic portions within the pre-drilled holes.

56. An intramedullary implant according to claim 55, wherein the plastic portions have openings therein.

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